

**REMARKS**

Claims 1, 2, 4, 6, 8, 12-17, and 27 have been amended to further clarify the invention and to correct typographical errors, and claims 16 and 28-32 have been canceled. (It should be noted that the claim amendments are for clarifying, and not narrowing, the scope of the claims.) Thus, claims 1-15, 17-24, and 27 are pending and at issue, with claims 1 and 27 being independent claims. Claims 25-26 were canceled by an earlier amendment.

In the office action mailed on July 11, 2005, claims 6-15 and 18-20 were deemed as withdrawn from further consideration as being drawn to a non-elected invention. However, as set forth in further detail below, it is believed that claim 1 is allowable, and therefore claims 6-15, and 18-20, deemed to be directed to a non-elected invention, are also allowable. Accordingly, the applicants do not believe it is necessary to cancel claims 6-15 or 18-20, since these claims depend from claim 1.

In the office action mailed on July 11, 2005, claims 1-5, 16, 17, 21-24, and 27 were rejected under 35 U.S. C. § 112, first paragraph, as failing to comply with the enablement requirement. Claims 1-5, 16, 17, 21-24, and 27 were also rejected under 35 U.S. C. § 112, second paragraph, as being indefinite. Claims 1-5, 16, 21, 22, 24, and 27 were rejected as being anticipated by Needelman, U.S. Patent No. 6,266,616. Claim 16 was rejected under 35 U.S.C. § 103(a) as unpatentable over Needelman in view of Smith, U.S. Patent No. 4,787,579, and claim 23 was rejected under 35 U.S.C. § 103(a) as unpatentable over Needelman in view of Bertheux, U.S. Patent No. 5,653,407.

Reconsideration and allowance of the claims is respectfully requested in view of the following remarks.

Claim 1, as amended, and claims 2-15 and 17-24 depending therefrom, are directed to an attitude determination and control system for a spacecraft. The attitude determination and control system includes a attitude sensor set that is adapted for use during both transfer orbit operation and on-station operation of the spacecraft, and a processor capable of determining and controlling attitude of the spacecraft during those operations using sensor inputs solely from the attitude sensor set.

Claim 4 has been amended to recite that, according to one aspect of the invention, star tracker data is used at least in part to determine spacecraft spin rate. Similarly, claim 8 has been amended to recite that, according to another aspect of the invention, a gyro device is used at least in part to determine spacecraft spin rate.

Claim 27 is directed to an attitude determination and control system for a spacecraft that includes a plurality of star trackers adapted for use during both transfer orbit operation and on-station operation of the spacecraft, and a processor capable of determining and controlling attitude of the spacecraft during those operations using inputs from the star trackers as the sole source of attitude sensor data.

#### 35 U.S.C. § 112 Rejections

Claims 1-5, 17, and 21-24 have been rejected under U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement. Applicants respectfully traverse this rejection. The rejection indicated that the term “unified” was not specifically defined. Claims 1 and 27 have been amended to remove the term “unified,” as have the dependent claims 2, 6, and 12. Accordingly, this rejection is moot in view of the claim amendments.

Claims 1-5, 17, 21-24, and 27 have also been rejected under the same provision of the statute as failing to comply with the enablement requirement, due to the use of the phrase “all phases of operations.” Applicants respectfully traverse this rejection, since claims 1 and 27, as amended to omit that phrase, and now recite that the attitude sensor set is adapted for use during both transfer orbit operation and on-station operation.

Claims 1-5, 17, and 21-24 have also been rejected under the same statute for failing to comply with the enablement requirement due to the recitation of a processor capable of determining and controlling attitude of a spacecraft during operations “solely using sensor input from the unified sensor set.” Applicants respectfully traverse these claims rejections, as claims 1 and 27 have been amended to clarify that the processor is capable of determining and controlling attitude of a spacecraft during operations using sensor inputs solely from the sensor set. Thus the word “solely” has been moved to a more appropriate

point of claims 1 and 27, so that there would not be any confusion regarding whether the claim may be interpreted to indicate that sensors are manipulated to “control” spacecraft attitude. A similar amendment has also been made to claim 13.

Claim 4 has been rejected under the same statute as failing to comply with the enablement requirement due to the use of the phrase “spacecraft rate.” Applicants respectfully traverse this rejection, in view of an amendment that has been made to claim 4 in order to recite “spacecraft spin rate.” Thus, the claim has been clarified so that one of ordinary skill in the art will understand that the claim is directed to the use of star tracker data for determination of spacecraft spin rate.

Claims 1-5, 17, 21-24, and 27 have been rejected under 35 U.S.C. § 112, second paragraph as being indefinite due to the use of the term “unified.” Applicants respectfully traverse this rejection as moot, since, as noted above, claims 1 and 27, as well as dependent claims 2, 6, and 12, have been amended to remove the word “unified.”

Regarding claim 1, as noted above, the word “solely” has been moved to clarify that the star tracking sensors are not used to move a spacecraft.

Regarding claim 4, as noted above, the word “spin” has been inserted before “rate” in order to clarify the language of the claim.

With regard to claim 5, the rejection to the extent is based on the use of “bi-propellant” is not understood as this word does not appear in claim 5. Assuming that the examiner meant to refer to claim 17, this rejection is respectfully traversed, as the claim has been amended to recite that the transfer orbit operations include a transfer orbit operation that is performed using a bi-propellant thruster. Regarding claims 1 and 27, as noted above, the phrase “all phases of spacecraft operation” has been removed from claims 1 and 27.

#### 35 U.S.C. § 102(b) Rejections

Claims 1-5, 21, 22, 24, and 27 have been rejected under 35 U.S.C. § 102(b) as being anticipated by Needelman. Applicants respectfully traverse these rejections. Under Section 2131, the MPEP directly states: “A claim is anticipated only if each and every

element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." See, *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987).

As noted at column 4, lines 1-7 thereof, Needelman is directed to the use of various specialized sensors that correspond to specific spacecraft operations. For example a "transfer orbit sun sensor 204, and acquisition sun sensor 206, ... , a transfer orbit earth sensor 210, an operational orbit earth sensor 212 ..." Needelman discloses the use of specialized sensors, some of which are only used during a specific operation. For example, the use of a "transfer orbit earth sensor 210" and an "operational orbit earth sensor 212" indicates that each sensor is used only during transfer orbit operations, and on-station operations, respectively. Accordingly, Needelman is not directed to a system or method that uses an attitude sensor set that is adapted for use during both transfer orbit operation and on-station operation, as recited in claims 1 and 27, as amended. Thus, for example, Needelman fails to disclose or suggest the use of star trackers or any set of sensors during both transfer orbit and on-station operation. Accordingly, the anticipation rejections based on Needelman are improper and should be withdrawn.

#### 35 U.S.C. § 103(a) Rejections

Claim 23 has been rejected as obvious over Needelman in view of Bertheux et al., U.S. Patent No. 5,653,407. Applicants respectfully traverse this rejection.

"To establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art." MPEP § 2143.03. As noted above with regard to the anticipation rejections, Needelman does not disclose or suggest the use of an attitude sensor set that is adapted for use during both transfer orbit and on-station operations. Bertheux et al. does not provide teachings to make up for the deficiencies of Needelman in this regard. So, even if one were to combine the teachings of Needelman with the teachings of Bertheux et al., one would not be able to achieve the invention of claim 23. Because the cited references do not teach or suggest the use of an attitude sensor set that is adapted for use during both transfer orbit and on-station operations, *prima facie* obviousness


cannot be established. Accordingly, the rejection of claim 23 as obvious over Needelman in view of Bertheux et al. is improper and should be withdrawn.

Conclusion

For the foregoing reasons, reconsideration and withdrawal of the rejections of the claims and allowance thereof is respectfully requested. Should the examiner wish to discuss the foregoing, or any matter of form, in an effort to advance this application towards allowance, the examiner is urged to telephone the undersigned at the indicated number.

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Respectfully submitted,

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